Before the
FEDERAL COMMUNICATIONS COMMISSION FCC 95-148
Washington, DC 20554

In the Matter of	)	
	)	
	)	
Amendment of Parts 15 and 90	)	
of the Commission's Rules to	)	ET Docket No. 93-235
Provide Additional Frequencies	)	RM-8094
for Cordless Telephones	)	

REPORT AND ORDER

Adopted: April 5, 1995 ; **Released:** April 10, 1995

By the Commission:

INTRODUCTION

1. By this action, we are amending Parts 15 and 90 of the rules to provide additional frequencies in the 44 and 49 MHz bands for the operation of cordless telephones. This action will significantly improve the operation and convenience of cordless telephones, making it easier for consumers to obtain improved wireless access to telephone service. In particular, the additional channels we are providing will relieve channel crowding and congestion and reduce interference to existing cordless telephone service operating under Part 15 of our rules.[1]

BACKGROUND

2. A cordless telephone is a two-way low power radio system that is used for voice communications on the public switched telephone network (PSTN). A cordless telephone consists of a "base" unit that connects to the PSTN and a "remote" handset. The base unit and the handset are connected by a radio link that eliminates the handset cord of the standard telephone, thus allowing the user to move away from the base unit while carrying on a

[1] The frequencies for operation of cordless telephones are set forth in Section 15.233 of the rules, 47 C.F.R. §15.233.

telephone conversation. The radio frequency components of cordless telephones operate under the provisions of Part 15 of the Commission's rules. There are ten pairs of frequencies available at 46 and 49 MHz for cordless telephones.[2] Sales and use of cordless telephones have grown steadily over the years, and it is estimated that more than 60 million cordless telephones are currently in use.[3]

3. On August 20, 1992, the Personal Communications Section of the Telecommunications Industry Association (TIA) submitted a Petition for Rule Making (RM-8094) seeking additional frequencies for cordless telephones. TIA stated that additional cordless telephone channels are needed to relieve channel-crowding problems, due to the widespread popularity of these devices. It also noted that the congestion problem is compounded by the fact that five of the existing ten channels are available for other Part 15 low power transmitters such as baby monitors.[4] TIA suggested that an additional 15 channel pairs using 30 frequencies near 44 and 49 MHz be made available for cordless telephone use.

4. On August 20, 1993, the Commission adopted a Notice of Proposed Rule Making (Notice) in this proceeding.[5] In the Notice, the Commission proposed to make available for cordless telephone use the additional 15 channel pairs suggested by TIA.[6] These frequencies are currently allocated to the Private Land Mobile Radio Service (PLMRS). The Commission indicated that since PLMRS use of this spectrum is relatively light and/or is typically located away from residential areas, cordless telephones could share these frequencies.[7] The Commission also proposed to require that cordless telephones operating on

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[2] See Report and Order, GEN Docket No. 83-325, 49 FR 1512 (1984). See also 47 CFR § 15.233. The 46 MHz and 49 MHz frequencies used by cordless telephones under Part 15 are allocated to the Federal Government for fixed and mobile services.

[3] See Notice of Proposed Rule Making in GEN Docket No. 93-235, 8 FCC Rcd. 6782 at para. 3 and Cobra at p. 1, November 18, 1993.

[4] See 47 CFR Section 15.235. In addition, all ten cordless telephone channels may be used by extremely low power transmitters pursuant to 47 CFR Section 15.209; however, such transmitters are unlikely to cause interference to cordless telephones.

[5] See Notice of Proposed Rule Making in GEN Docket No. 93-235, 8 FCC Rcd. 6782.

[6] Specifically, the Commission proposed use of the following frequencies in MHz: 43.72, 43.74, 43.82, 43.84, 43.92, 43.96, 44.12, 44.16, 44.18, 44.20, 44.32, 44.36, 44.40, 44.46, 44.48, 48.76, 48.84, 48.86, 48.92, 49.02, 49.08, 49.10, 49.16, 49.20, 49.24, 49.28, 49.36, 49.40, 49.46, and 49.50.

[7] The 30 frequencies proposed for new cordless channels are allocated to the PLMRS for use by the Land Transportation, Petroleum and Forest Products Radio Services. According to our license data base, there are fewer than 60 assignments, covering less than

these new frequencies incorporate a mechanism for automatically monitoring and preventing activation on any occupied channel. The proposed frequencies in the 44 MHz band are located in the intermediate frequency (IF) pass-band of TV receivers.[8] The Commission therefore proposed to designate the lower band, i.e., 44 MHz, for base units in order to minimize interference to TV broadcasting and not to require any specific pairing of frequencies. It further requested comment on certain other technical aspects associated with cordless telephone operation. Namely, it requested comment on whether to continue to allow cordless telephone operating frequencies to be offset from the center of cordless telephone channels and whether 20 kHz is the appropriate bandwidth for operation on the new frequencies.[9]

5. Seventeen parties submitted comments and/or reply comments in response to the Notice.[10] The commenting parties representing cordless telephone manufacturers agree that there is a need for additional cordless telephone frequencies to relieve channel congestion. Some of these parties raise concerns with respect to specific technical requirements and implementation procedures. Other parties, generally representing land mobile and broadcast interests, express concern about potential interference problems and question the need for additional cordless telephone spectrum.

1000 mobile units, on each of the proposed 44 MHz frequencies and fewer than 260, covering 3400 mobile units, on each of the proposed 49 MHz frequencies. We note that cordless telephones use extremely low power and are likely to cause interference only when located in close proximity to a PLMRS receiver. (The emission level allowed under our rules for cordless telephones equates to about 25 microwatts, see 47 C.F.R. §15.233.) It appears that most PLMRS operations on these frequencies are transient or located away from residential areas where cordless telephones are typically located.

[8] TV receivers employ an IF amplifier having a band-pass of 41 to 47 MHz.

[9] See 47 CFR Section 15.233. The original rules for cordless telephones required each channel to be centered in a 20 kHz bandwidth. The Commission subsequently amended the rules to permit manufacturers to place two (or more) signals inside the 20 kHz bandwidth by narrowing signals to 10 kHz and offsetting them from the center of the channel. Thus, a manufacturer could design equipment that divided the existing ten channels into twenty channels. See Report and Order, GEN Docket No. 89-626, 6 FCC Rcd 4434 (1991). TIA and Uniden America Corp. (Uniden) submitted Petitions for Reconsideration of the "channel offset" rule, requesting that we reverse our decision to allow offset channel operation. In the Notice, the Commission indicated that it would address the matter of channel offsets for both the existing and proposed cordless telephone frequencies concurrently, in this proceeding, so that its rules will be consistent. It further stated that it would address the TIA and Uniden petitions in the context of that decision.

[10] Appendix B contains a list of those filing comments.

DISCUSSION

New Cordless Telephone Frequencies

6. In the Notice, we tentatively found it in the public interest to make additional frequencies available for cordless telephones in the 44 and 49 MHz regions of the spectrum. In this regard, we observed that the existing ten cordless telephones channels have become very congested and that there continues to be strong demand for low-priced cordless telephones that use 46/49 MHz technology. We therefore proposed to make the 30 frequencies suggested by TIA available for cordless telephones under Part 15. We requested comment on the suitability of the proposed 44 and 49 MHz frequencies for cordless telephone use, particularly with regard to the potential for interference with PLMRS operations and with intermediate frequencies (IF) in broadcast TV receivers. In particular, with regard to TV receivers, we requested comment on whether the proposed 44 MHz frequencies pose a significantly greater interference risk to the reception of television broadcasting than the 46 MHz frequencies already used by cordless telephones.

7. American Telephone and Telegraph Company (AT&T), Cobra Electronics Corporation (Cobra), the Consumer Electronics Group of the Electronic Industries Association (EIA/CEG), the North American Foreign Trading Corporation (NAFTC), Radio Shack Division of Tandy Corporation (Radio Shack), Sony Electronics Inc. (Sony), TIA, Thomson Consumer Electronics (Thomson), and Uniden support our proposal to provide additional channels for 46/49 MHz cordless telephones. These parties submit that interference to existing cordless telephones is commonplace, particularly in congested urban areas, and that additional frequencies are needed to support continued growth in the use of cordless telephones. AT&T, NAFTC, Radio Shack, TIA, and Uniden argue that the proposed frequencies are the most suitable for augmenting the channels available for cordless telephones due to the proximity of the proposed frequencies to the existing cordless telephone frequencies. They point out that this will permit the economical design of cordless telephones that use both the existing and the new frequencies.

8. AT&T, TIA and Uniden state that the proposed frequencies can be used by cordless telephones without impairing PLMRS operations. They point out that cordless telephones operate at very low power, typically about 25 to 30 microwatts. They argue that this will generally prevent cordless telephones from interfering with PLMRS operations that operate at much higher powers of 25 to 50 watts for mobiles and 300 watts for base stations. TIA argues that a PLMRS system designed to be reliable in the presence of ambient background noise, such as vehicle ignition systems, should not be adversely affected by cordless telephones. Uniden states that when the separation distance between a cordless telephone and the PLMRS radio is greater than 50 to 100 feet, the man-made radio noise from automotive electrical systems and other sources will typically be greater than the received energy from a cordless telephone. Uniden also submits that PLMRS usage is either non-existent or very sparse in most parts of the country. AT&T further indicates that, under Part 15, cordless telephones may not cause interference with authorized services and must

cease operation upon notification that harmful interference exists. Uniden, as a manufacturer of products that operate under both Part 15 and Part 90, states that it has stopped production of all Part 90 equipment that operates in the proposed bands. Uniden indicates that the purchasing trend for this type of equipment has shifted to higher frequency bands that employ more sophisticated trunking technology.

9. EIA/CEG, Sony, TIA and Thomson state that the additional cordless telephone channels are needed and that use of these channels would not be expected to cause interference to television receivers. They state that interference to television receivers can only occur when cordless telephones are used in very close proximity to the TV or VCR. Sony states that, as a manufacturer of both cordless telephones and TV sets, it fully supports the addition of the 15 new channels to the existing 10 channel cordless telephone service and believes that the additional channels will have no substantial detrimental effect on current television receivers. It also points out that current instruction manuals for Sony cordless telephones already include instructions to relocate the base unit away from the television receiver if any interference is detected. EIA/CEG and Thomson also believe that a simple cautionary note in the instruction manuals of cordless telephones would be sufficient to avoid such interference. In addition, EIA/CEG and Uniden both support limiting the 44 MHz frequencies to cordless base stations as a means of minimizing interference to TV reception.

10. American Petroleum Institute (API), Forest Industries Telecommunications (FIT), Industrial Telecommunications Association (ITA) and Utilities Telecommunications Council (UTC) oppose use of 44/49 MHz PLMRS frequencies by cordless telephones based on interference concerns. API, FIT, and UTC argue that cordless telephones have the potential to interfere with PLMRS users who have a need for reliable, around-the-clock and interference-free communications, especially in the event of a public emergency. API, FIT and UTC state that the proposed new 44/49 MHz frequencies are not "lightly-used" and that there is substantial use of these frequencies in and around many major metropolitan areas. API, FIT and UTC argue that the needs of cordless telephone users already can be met by cellular telephones, personal communications services and Part 15 operations in other bands. UTC states that our refarming initiative will make the proposed frequencies available for licensing to almost all private radio services. API expresses concern that if a cordless telephone operating on the new frequencies were to emit certain audible or sub-audible tones it might inadvertently capture a PLMRS mobile relay transmitter, causing the wide area retransmission of cordless telephone conversations over PLMRS systems. In response, AT&T and TIA state that API's claim that tones from cordless telephones could seize PLMRS transmitters and retransmit telephone conversations is groundless. They explain that according to Part 15 rules, cordless telephones using the new frequencies must use digital security coding and therefore will not use guard tones for signalling.

11. API, FIT and UTC state that interference to cordless telephones from PLMRS

operations could be severe.[11] They caution that even though the Part 15 rules provide that cordless telephones must accept interference, consumers do not understand the nuances of the Commission's rules and could expect PLMRS operators to respond to interference complaints. FIT states that it is not realistic to expect the Commission to enforce the non-interference status of cordless telephones. Similarly, John C. Thomas expresses concern that the burden of eliminating interference will be placed on Part 90 licensees. The American Radio Relay League (ARRL) also expresses concern with respect to the susceptibility of cordless telephones to interference. While ARRL does not oppose the allocation of additional frequencies for cordless telephones, it does suggest certain actions that we could take to minimize interference complaints from new cordless telephone users.[12]

12. Association for Maximum Service Television and Public Broadcasting Service (MSTV and PBS), in joint comments, submit that alternative spectrum should be used for cordless telephones. MSTV and PBS state that use of the 44 MHz band for cordless telephone operation would result in harmful interference to TV reception. MSTV and PBS acknowledge, however, that the radius of potential interference extends only about 3 meters from the cordless telephone base station. They recommend that if we decide to allow use of 44 MHz frequencies by cordless telephones, we should: 1) require a visible warning on the cordless telephones packaging that explains the interference potential, and 2) require cordless telephone operators to resolve any interference problems.

13. Zenith opposes the proposed use of the 44 MHz band for cordless telephones and believes that no rule should be finalized until the television interference issues can be thoroughly analyzed. Zenith states that current TV receivers are 10 to 100 times more susceptible to interference from cordless telephones operating on these frequencies than those operating on the existing frequencies. In addition, Zenith believes that products equipped with an intermediate frequency pass-band (IF) television interface to solve cable compatibility requirements will present an additional concern with respect to potential IF interference on the proposed cordless telephone frequencies. Zenith also states that the proposed instructions to purchasers of cordless telephones may help them avoid interference with their own television receivers. However, Zenith contends that the proposed instructions will not be

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[11] Using an example of a 100 watt PLMRS transmitter, FIT predicts that depending on the receiver sensitivity of the cordless telephone, users within a 60 mile radius of the transmitter will experience interference.

[12] ARRL suggests that: 1) The Commission should issue a public notice warning consumers of cordless telephones that they may be subject to interference, and that in such cases, no interference protection is offered, and that transmitter operators are not obligated to resolve any such interference; 2) Cordless telephone labels should emphasize the possible interference susceptibility of the device, and direct consumers to the manufacturer for suggested remedies; and 3) The Commission should request TIA and other standards organizations to develop standards for interference rejection for cordless telephones.

able to prevent interference in the multi-family environment and does not believe that any instructions could be crafted to eliminate such interference.

14. In *ex parte* comments, filed February 23, 1994, TIA submits that Zenith's own data shows that concerns regarding TV interference are considerably overstated. TIA argues that the Zenith data, when considered together with well-known relationships between field strength and distance, show that a cordless telephone base unit operating on the "worst-case" proposed new frequency must be within about 2 feet of the television receiver in order to cause interference. Moreover, TIA states that the 20 dB difference in susceptibility between the proposed and existing frequencies (the factor of 100 noted by Zenith) is not significant because it translates to a difference of only about one foot in required separation distance.

15. Decision. As indicated above, 46/49 MHz cordless telephones are very popular and have achieved substantial penetration in American households. We continue to believe that there will be strong demand for cordless telephones that use this technology. In this regard, we note that in 1993, some 16 million additional 46/49 MHz cordless telephones were purchased by consumers in this country.[13] We are concerned that the channel crowding and congestion that have arisen in recent years because of the increasing popularity of these devices is now seriously affecting the quality of cordless telephone service. We therefore find that additional channels are needed for use by 46/49 MHz cordless telephones. While we believe that many consumers may eventually be attracted to alternative cordless telephone technologies and future personal communications services, we believe that the public should have a choice of many diverse products, including low-cost cordless telephones, to satisfy their communications needs.[14] We also believe that the proposed 44 and 49 MHz channels are the most desirable for augmenting the channels available for cordless telephones. As indicated by several of the commenting parties, the proximity of these frequencies to the existing cordless telephone frequencies will permit the economical design of new devices that use both the new and existing frequencies.

16. We also find that cordless telephones operating on the frequencies we have proposed to make available for 46/49 MHz cordless telephones will not pose a significant risk of harmful interference to PLMRS operations. As indicated by TIA and Uniden, it can be expected that a PLMRS system designed to be reliable in the presence of ambient background noise, such as the noise from vehicle ignition systems, will not be adversely affected by the operation of cordless telephones. These telephones use extremely low power and thus are likely to be able to interfere with PLMRS communications only when located in close proximity to a PLMRS receiver. The risk of such interference can be further mitigated

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[13] See Electronic Industries Association's "1994 Electronic Market Data Book."

[14] For example, cordless telephones may operate at 915 MHz and 2450 MHz under Part 15 of the rules . In addition, we have set aside 20 MHz for unlicensed personal communications services (PCS).

by requiring cordless telephones using the new frequencies to include a channel selection mechanism to prevent establishment of a link on an occupied frequency, as proposed in the Notice and discussed below. In any event, the Part 15 rules require that a cordless telephone cease operation if it is found to cause harmful interference.[15] Cordless telephone users will be responsible for eliminating any interference that might result from the operation of cordless telephones on the new frequencies.

17. We similarly are not persuaded that interference to cordless telephones from PLMRS operations is likely to be a serious problem that would make the proposed frequencies unsuitable for cordless telephone use. Notwithstanding the claims of API, FIT and UTC, it appears that PLMRS use of the proposed frequencies is very light to non-existent in most densely populated areas.[16] While we recognize that there are some cases where PLMRS operations are located in or very nearby more densely populated areas, in most such areas there are few or no PLMRS operations present. Even where PLMRS operations are present, such operations are not active all the time and do not use all of the proposed new frequencies. Moreover, as indicated by Uniden, the trend in new PLMRS equipment is towards products that operate in higher frequency bands and employ more sophisticated trunking technologies. It also is extremely unlikely that all 15 of the proposed channel pairs would be occupied by PLMRS communications at the same time in an area where those frequencies were being used by PLMRS. The automatic channel selection feature of the cordless telephone would first choose an unoccupied pair of frequencies. If a PLMRS communication were subsequently initiated on the selected channel, the cordless telephone user could simply switch to another unoccupied channel. We recognize, as raised by UTC, that our refarming proceeding may ultimately result in the new cordless telephone frequencies also being available for use by a wide variety of non-commercial users.[17] We believe, however, that the trend for PLMRS users to operate on higher frequencies will keep the overall number of land mobile users on these frequencies quite low.

18. We further find that cordless telephone use of the 44 MHz band is compatible with the operation of broadcast TV receivers. The record indicates that the potential for interference between a TV receiver and a cordless telephone is very low. We do not find that the potential for interference to TV receivers caused by cordless telephones operating on these new frequencies would be substantially greater than that of existing cordless telephones. At most, it appears that the potential for interference is limited to cases where a cordless telephone transmitter is located within a few feet of the TV receiver. We believe instances of such interference can be reduced by simply not locating a cordless telephone close to a TV set. Nevertheless, we believe that a cautionary note to the consumer explaining the possible

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[15] See 47 CFR Section 15.5.

[16] See footnote 7, supra.

[17] See Notice of Proposed Rule Making, PR Docket No. 92-235, 7 FCC Rcd 8105 (1992).

need to move the cordless telephone away from the television receiver, as suggested by some parties, is appropriate. Therefore, we will require that manufacturers or suppliers of cordless telephones using the new frequencies include information in their instruction manual on potential interference to TV receivers. This information should indicate that: 1) some cordless telephones operate at frequencies that may cause interference to nearby TVs and VCRs; 2) to minimize or prevent such interference, the base of the cordless telephone should not be placed near or on top of a TV or VCR; and, 3) if interference is experienced, moving the cordless telephone farther away from the TV or VCR will often reduce or eliminate the interference. Accordingly, we are making the 30 frequencies in the 44 MHz and 49 MHz bands proposed in the Notice available for cordless telephone use, subject to the conditions and operating requirements set forth herein.

Automation Channel Selection Requirement

19. In the Notice, we proposed to require that cordless telephones using the new frequencies include a mechanism to avoid causing interference to the PLMRS. Specifically, we proposed to require that cordless telephones using these frequencies incorporate an automatic channel selection mechanism that will prevent establishment of a link on an occupied frequency. We invited comment as to whether there is a need for more specific requirements. We also invited comment as to whether we should require any specific information to be filed with equipment authorization applications to demonstrate compliance with this requirement.

20. AT&T, Radio Shack, TIA, and Uniden support our proposal to require cordless telephones using the new frequencies to incorporate an automatic channel selection mechanism. They state that such a mechanism is adequate to reduce the possibility of interference to PLMRS operations. They also oppose adoption of more specific requirements, arguing that the proposal set forth in the Notice would allow manufacturers the flexibility to implement the requirement in a manner that best suits the designs of their equipment. To demonstrate compliance with the automatic channel selection requirement, TIA recommends that a manufacturer include a description of its automatic channel selection mechanism with its application for equipment authorization.

21. UTC states that if cordless telephones are allowed to operate on the proposed frequencies, we should adopt specific requirements to avoid interference. UTC supports the incorporation of an automatic channel selection mechanism and adds that the monitoring should take place prior to transmitter activation. It also suggests that we increase the attenuation requirements for off-channel signals and require manufacturers to design their cordless telephones in a way that makes it difficult for end users to tamper with the power output levels. Cobra agrees in principle with the proposal for an automatic channel selection requirement, but is concerned that it will preclude the sale of single channel telephones. It suggests that we consider modifying our proposal to include a combination of both pre-scanning and real time scanning. Cobra also believes that the requirement as proposed is too vague and prefers that specific design requirements be adopted.

22. API states that the proposed automatic channel selection requirement fails to protect either land mobile operations or cordless telephone users. API states that this proposal does not take into account the mobility of PLMRS users and the fact that PLMRS communications can be intermittent. API argues that a vehicular PLMRS unit will not be detected when it is out of range of the cordless telephone but, as it moves into range of the cordless device, its higher power will interfere with the cordless telephone as well as receive interference from the cordless telephone. Additionally, API argues that if the cordless telephone operates on an inactive PLMRS channel and a land mobile system subsequently transmits on that same channel, then either the cordless telephone conversation would be disrupted or the reliability of the land mobile transmission would be compromised. API also states that the proposal fails to properly address whether monitoring should be undertaken at both the base unit and handset or in only one of the units.

23. In its reply comments, TIA disagrees with API that the automatic channel selection requirement does not account for mobility and temporary inactivity of PLMRS operations. TIA counters that a cordless telephone will detect the presence of an approaching mobile transmitter, even if it is intermittently active, well before the mobile is near enough to receive a signal from the low power cordless telephone. Additionally, TIA states that a PLMRS system designed for high reliability should be able to operate in the presence of a cordless telephone signal even if the cordless telephone were to remain on the channel. With regard to temporary inactivity, TIA explains that if a PLMRS mobile is within range of its base station, then the cordless telephone will detect the base station transmission and avoid the channel. TIA also responds to API's argument that the proposal fails to properly address whether monitoring is to be conducted at the base unit and handset or in only one of the units. In particular, TIA states that the base unit will check for occupancy on both the 44 and 49 MHz frequencies before establishing a communications link. It further explains that because of the close proximity of the cordless handset to its base, and the simplex operation of the PLMRS transceivers, the handset will not be able to establish a link on a 44 or 49 MHz frequency in use by a PLMRS transceiver.

24. Decision. As discussed above, we believe that the potential for interference from cordless telephone operations on the new frequencies to PLMRS users is very low. Nevertheless, given the likelihood that cordless telephone use could become widespread on these frequencies, we believe it is necessary to provide additional safeguards to protect PLMRS operations. Accordingly, we will require that cordless telephones using the new frequencies must employ a mechanism to avoid causing interference to PLMRS operations. Cordless telephones operating on the new frequencies will be required to incorporate an automatic channel selection mechanism that will prevent establishment of a link on any occupied frequency. In response to API's concern, we are clarifying that the automatic channel selection mechanism must prevent establishment of a link if either the base transmission frequency or the handset transmission frequency is occupied. We recognize that all automatic channel selection mechanisms may not prevent interference to the cordless telephone user if a PLMRS transmitter begins operation after the cordless telephone connection is established. However, Section 15.5(b) of our rules require that users accept

such interference. As such, if a cordless telephone conversation is interrupted by a PLMRS user, the conversation may be continued by switching to another available channel. We also do not find that it is necessary or desirable to impose more specific design standards for the automatic channel selection requirement. We believe that it is important to allow manufacturers the flexibility to implement this requirement in a manner that best suits the design of their equipment. We agree with TIA that a manufacturer should include a description of its automatic channel selection mechanism with its application for equipment authorization. Therefore, we will require that a statement describing the means and procedures used to achieve automatic channel selection shall be included in any application for equipment authorization of a cordless telephone using the new frequencies. We note that we currently require a similar statement with regard to security coding features on cordless telephones.[18]

25. We recognize Cobra's concern that the automatic channel selection proposal appeared to exclude single-channel cordless telephones. We do not intend to prohibit single-channel telephones from using the new frequencies, provided that such units incorporate a mechanism to avoid causing interference to PLMRS operations. This mechanism must prevent establishment of a link on any occupied frequency. We are not adopting UTC's suggestions that we increase the requirements for attenuation of spurious emissions from cordless telephones operating on the new frequencies and that we require that cordless telephones be designed so as to make it difficult for end users to tamper with the power output levels. The existing spurious emissions limits for cordless telephones are already so low that it is extremely unlikely that spurious emissions from these devices could cause interference. We also are unaware of any existing cordless telephones that allow the user to easily modify the output power.

Frequency Pairing

26. In the Notice, we proposed not to pair the new cordless telephone frequencies.[19] We did, however, propose to restrict the use of the lower frequencies at 44 MHz to cordless telephone base units in order to minimize potential interference to television broadcasting.

27. Cobra, Radio Shack and TIA support our proposal not to pair the frequencies. They indicate that this would allow any new base transmitter frequency to be used with any new handset transmitter frequency and would help avoid interference to PLMRS. TIA and Uniden support the proposal to use the lower frequencies for cordless telephone base units. Uniden, for example, states that, although it does not perceive interference to television receivers to be a significant problem, it supports the designation of the lower frequencies at

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[18] See 47 CFR 15.214.

[19] That is, we proposed not to require that a specific cordless handset frequency be used only with a specific cordless base frequency and vice versa.

44 MHz for base units. No parties opposed either of these proposals.

28. Decision. We continue to believe that frequency pairing would unnecessarily constrain the ability of cordless telephones to select frequencies that avoid interference to the PLMRS. Accordingly, we will not designate the new frequencies into specific frequency pairs. We will also designate the lower frequencies at 44 MHz for base units so as to minimize potential interference to television broadcasting.

Channel Offsets and Bandwidths

29. The original rules for cordless telephones required each channel to be centered in a 20 kHz bandwidth. The Commission subsequently proposed and amended the rules in GEN Docket No. 89-626 to permit manufacturers to place two (or more) signals inside the 20 kHz bandwidth by narrowing signals to 10 kHz and offsetting them from the center of the channel.[20] Thus, a manufacturer could design equipment that divided the existing ten channels into twenty channels. This became known as the "channel offset" rule. TIA and Uniden submitted petitions requesting reconsideration of the offset channel rule.[21] In its petition for additional cordless telephone frequencies, TIA references its petition for reconsideration of the offset channel rule and states that offset channels should not be used for the proposed new frequencies.

30. In the Notice, we stated that the matter of channel offsets should be considered concurrently for both the existing and proposed new cordless telephone channels so that our rules for cordless telephone rules would be consistent. Accordingly, we held TIA's and Uniden's petitions in abeyance pending our determination on providing additional cordless telephone channels in this proceeding. In particular, we invited comment as to whether 20 kHz is the appropriate bandwidth for the new frequencies.

31. All of the parties commenting on this issue support 20 kHz as the most appropriate channel bandwidth for cordless telephones and request that the channel offset rule be reconsidered. AT&T and Cobra, for example, support not allowing channel offsets on either the new frequencies or the original frequencies. AT&T agrees that there should be a

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[20] See Notice of Proposed Rule Making, GEN Docket No. 89-626, 5 FCC Rcd 309 (1990), and Report and Order, GEN Docket No. 89-626, 6 FCC Rcd 4434 (1991).

[21] In their Petitions for Reconsideration, TIA and Uniden argue that offset channel operation would require narrowing of the FM signals used by current cordless telephones. They contend that this will degrade the FM capture ratio, which in turn will reduce the ability of cordless telephone receivers to reject interference. TIA submitted a detailed technical analysis showing that the increased vulnerability of cordless telephone receivers to interference would negate any increase in spectrum efficiency gained by dividing the current 20 kHz channels.

uniform channel bandwidth of 20 kHz for cordless telephones using both the existing and the new frequencies. TIA encourages us to grant its Petition for Reconsideration in GEN Docket No. 89-626 concurrently with taking action on the instant proceeding. It states that 20 kHz is the appropriate bandwidth for the FM transmission format used by cordless telephones. Uniden states that use of channel offsets will cause significant interference to existing cordless telephones service, and supports abolishing the channel offset rule for the existing as well as the proposed new cordless telephone channels. Uniden also supports 20 kHz as the appropriate channel bandwidth for the new and existing frequencies.

32. Decision. When we adopted rules permitting channel offset, we were seeking to provide some relief from overcrowding of the cordless telephone channels. At that time, however, additional frequencies for cordless telephones near the existing 46/49 MHz cordless telephone bands were not being considered. The 15 additional channels we are providing herein will more than double the number of frequencies available for cordless telephone use. With this increase in the number of available channels, we now agree with the industrial parties that the added potential for cordless telephone interference from offset channel operation makes such operation less desirable. Accordingly, we are granting the Petitions of Reconsideration of TIA and Uniden in GEN Docket No. 89-626 with regard to the offset channel rule. We are amending the rules to eliminate the offset channel authority and provide for 20 kHz operation on both the existing and new cordless telephone channels.

Other Matters

33. In the Notice, we proposed to make these rules effective 30 days after publication of the Report and Order of this proceeding in the Federal Register. We also stated that we did not plan to permit modification (e.g., change of crystals) of existing cordless telephones to operate on the new frequencies due to the need to include automatic channel selection capability to avoid interference to the PLMRS.

34. Cobra and NAFTC request that the effective date be delayed for six to twelve months after the adoption of the Report and Order, rather than the 30 days proposed in the Notice. These parties would like a longer transition period to be able to reduce their inventories of existing cordless telephones. They state that due to long production lead times of 6 to 12 months, companies have to irrevocably commit to production quantities several months in advance and therefore always tend to have high inventories. AT&T and Uniden oppose delaying the effective date as suggested by Cobra and NAFTC. For example, AT&T states that there is no reason to limit the public's ability to benefit from the provision of additional channels as soon as manufacturers are able to produce new equipment. No parties objected to our proposal to prohibit modification of existing cordless telephones to operate on the new frequencies.

35. Decision. We disagree with those parties that suggest implementation of the new cordless telephone channels should be delayed. We do not find that the public interest would be served by delaying the benefits flowing from the availability of these new channels,

merely to allow importers and manufacturers to deplete their existing inventories. Accordingly, the new rules will be effective 30 days after publication of this Report and Order in the Federal Register. We are also adopting our proposal to prohibit modification (e.g., change of crystals) of existing cordless telephones to operate on the new frequencies. This will ensure that all operations on the new frequencies will include an automatic channel selection capability to avoid interference to the PLMRS.

PROCEDURAL INFORMATION

36. Regulatory Flexibility Analysis. The analysis required by the Regulatory Flexibility Act of 1980, 5 U.S.C. Section 608, is contained in Appendix C.

ORDERING CLAUSES

37. Accordingly, IT IS ORDERED that Parts 15 and 90 of the Commission's rules ARE AMENDED as specified in Appendix A, effective 30 days after publication in the Federal Register. Furthermore, IT IS ORDERED that the Petitions for Reconsideration filed by the Telecommunications Industry Association and Uniden America Corporation in GEN Docket No. 89-626 ARE GRANTED with regard to the offset channel rule as described above. This action is taken pursuant to the authority contained in Sections 4(i), 302, 303(e), 303(f), and 303(r) of the Communications Act of 1934, as amended.

FEDERAL COMMUNICATIONS COMMISSION

William F. Caton
Acting Secretary

APPENDIX A: Final Rules

A. Title 47 of the Code of Federal Regulations, Parts 15 and 90, are amended to read as follows:

PART 15 -- RADIO FREQUENCY DEVICES

1. The authority citation for Part 15 continues to read as follows:

AUTHORITY: Sections 4, 302, 303, 304, and 307 of the Communications Act of 1934, as amended, 47 U.S.C. Sections 154, 302, 303, 304, and 307.

2. Section 15.233 is amended by revising the section heading and paragraphs (b) and (d), to read as follows:

Section 15.233 Operation within the bands 43.71 - 44.49 MHz, 46.60 - 46.98 MHz, 48.75 - 49.51 MHz and 49.66 - 50.0 MHz.

* * * * *

(b) An intentional radiator used as part of a cordless telephone system shall operate centered on one or more of the following frequency pairs, subject to the following conditions:

(1) Frequencies shall be paired as shown below, except that channel pairing for channels one through fifteen may be accomplished by pairing any of the fifteen base transmitter frequencies with any of the fifteen handset transmitter frequencies.

(2) Cordless telephones operating on channels one through fifteen must: (i) incorporate an automatic channel selection mechanism that will prevent establishment of a link on any occupied frequency and (ii) the box or an instruction manual which is included within the box which the individual cordless telephone is to be marketed shall contain information indicating that some cordless telephones operate at frequencies that may cause interference to nearby TVs and VCRs; to minimize or prevent such interference, the base of the cordless telephone should not be placed near or on top of a TV or VCR; and, if interference is experienced, moving the cordless telephone farther away from the TV or VCR will often reduce or eliminate the interference. A statement describing the means and procedures used to achieve automatic channel selection shall be provided in any application for equipment authorization of a cordless telephone operating on channels one through fifteen.

Channel	Base Transmitter (MHz)	Handset Transmitter (MHz)
1	43.720	48.760
2	43.740	48.840
3	43.820	48.860
4	43.840	48.920
5	43.920	49.020
6	43.960	49.080
7	44.120	49.100
8	44.160	49.160
9	44.180	49.200
10	44.200	49.240
11	44.320	49.280
12	44.360	49.360
13	44.400	49.400
14	44.460	49.460
15	44.480	49.500
16	46.610	49.670
17	46.630	49.845
18	46.670	49.860
19	46.710	49.770
20	46.730	49.875
21	46.770	49.830
22	46.830	49.890
23	46.870	49.930
24	46.930	49.990
25	46.970	49.970

* * * * *

(d) The fundamental emission shall be confined within a 20 kHz band and shall be centered on a carrier frequency shown above, as adjusted by the frequency tolerance of the transmitter at the time testing is performed. Modulation products outside of this 20 kHz band shall be attenuated at least 26 dB below the level of the unmodulated carrier or to the general limits in Section 15.209, whichever permits the higher emission levels. Emissions on any frequency more than 20 kHz removed from the center frequency shall consist solely of unwanted emissions and shall not exceed the general radiated emission limits in Section 15.209. Tests to determine compliance with these requirements shall be performed using an appropriate input signal as prescribed in Section 2.989 of this Chapter.

* * * * *

PART 90 -- PRIVATE LAND MOBILE RADIO SERVICES

1. The authority citation for Part 90 continues to read as follows:

AUTHORITY: Sections 4, 303, and 332, 48 Stat. 1066, 1082, as amended; 47 U.S.C. Sections 154, 303, and 332, unless otherwise noted.

2. In Section 90.65, the table in paragraph (b) is amended, to add a new limitation "44" to fifteen frequencies, and a new paragraph (c)(44) is added, to read as follows:

Section 90.65 Petroleum Radio Service.

* * * * *

(b) *Frequencies available.* * * * * *

Petroleum Radio Service Frequency Table

Frequency or band	Class of station(s)	Limitations
***	***	***
Megahertz:		
***	***	***
48.76	do	10, 44
***	***	***
48.84	do	10, 44
48.86	do	10, 44
***	***	***
48.92	do	10, 44
***	***	***
49.02	do	10, 44
***	***	***
49.08	do	10, 44
49.10	do	10, 44
***	***	***

49.16	do	10, 44
***	***	***
49.20	do	10, 44
***	***	***
49.24	do	10, 44
***	***	***
49.28	do	10, 44
***	***	***
49.36	do	10, 44
***	***	***
49.40	do	10, 44
***	***	***
49.46	do	10, 44
***	***	***
49.50	do	10, 44
***	***	***

(c) * * *

(44) This frequency is also used on a secondary basis by cordless telephones under part 15 of this chapter.

* * * * *

3. In Section 90.67, the table in paragraph (b) is amended, to add a new limitation "38" to fifteen frequencies, and a new paragraph (c)(38) is added, to read as follows:

Section 90.67 Forest Products Radio Service.

* * * * *

(b) *Frequencies available.* * * * * *

Forest Products Radio Service Frequency Table

Frequency or band	Class of station(s)	Limitations

***	***	***
Megahertz:		
***	***	***
48.76	do	2, 38
***	***	***
48.84	do	2, 38
48.86	do	2, 38
***	***	***
48.92	do	2, 38
***	***	***
49.02	do	2, 38
***	***	***
49.08	do	2, 38
49.10	do	2, 38
***	***	***
49.16	do	2, 38
***	***	***
49.20	do	2, 38
***	***	***
49.24	do	2, 38
***	***	***
49.28	do	2, 38
***	***	***
49.36	do	2, 38
***	***	***
49.40	do	2, 38
***	***	***
49.46	do	2, 38
***	***	***

49.50	do	2, 38
***	***	***

(c) * * *

(38) This frequency is also used on a secondary basis by cordless telephones under part 15 of this chapter.

* * * * *

4. In Section 90.89, the table in paragraph (b) is amended, to add a new limitation "23" to fifteen frequencies, and a new paragraph (c)(23) is added, to read as follows:

Section 90.89 Motor Carrier Radio Service.

* * * * *

(b) *Frequencies available.* * * * * *

Motor Carrier Radio Service Frequency Table

Frequency or band	Class of station(s)	Limitations
***	***	***
Megahertz:		
***	***	***
43.72	do	4, 23
43.74	do	4, 23
***	***	***
43.82	do	4, 23
43.84	do	4, 23
***	***	***
43.92	do	5, 6, 23
***	***	***
43.96	do	5, 23
***	***	***

44.12	do	5, 23
***	***	***
44.16	do	5, 23
44.18	do	5, 23
44.20	do	5, 20, 23
***	***	***
44.32	do	5, 23
***	***	***
44.36	do	5, 6, 23
***	***	***
44.40	do	5, 6, 23
***	***	***
44.46	do	1, 23
44.48	do	1, 23
***	***	***

(c) * * *

(23) This frequency is also used on a secondary basis for cordless telephones under part 15 of this chapter.

* * * * *

APPENDIX B: Parties Filing Comments

1. American Petroleum Institute
2. American Radio Relay League, Inc.
3. American Telephone and Telegraph Company
4. Association for Maximum Service Television, Inc. and the Public Broadcasting Service (Jointly filed comments.)
5. Cobra Electronics Corporation
6. Consumer Electronics Group of the Electronic Industries Association
7. Forest Industries Telecommunications
8. Industrial Telecommunications Association, Inc.
9. North American Foreign Trading Corporation
10. Sony Electronics Inc.
11. Tandy Corporation, Radio Shack Division
12. Telecommunications Industry Association Mobile & Personal Communications Radio Section
13. John C. Thomas, AB8Z
14. Thomson Consumer Electronics, Inc.
15. Uniden America Corporation
16. Utilities Telecommunications Council
17. Zenith Electronics Corporation

APPENDIX C: Final Regulatory Flexibility Analysis

Pursuant to 5 U.S.C. Section 603, an Initial Regulatory Flexibility Analysis was incorporated in the Notice of Proposed Rule Making (NPRM) in ET Gen Docket No. 89-235. Written comments on the proposals in the NPRM, including the Regulatory Flexibility Analysis, were requested. The following Final Regulatory Flexibility Analysis has been prepared:

A. Need for and Objective of Rules: There is a need for additional cordless telephone frequencies to relieve channel congestion and reduce interference to cordless telephones operating in the 46 MHz and 49 MHz bands. The Commission is establishing additional frequencies for cordless telephones. The existing rule provisions that these devices have been operating under are considered by manufacturers to be inadequate to meet the growing consumer demand for these devices. The objectives of the proposed rules are to improve the ability of cordless telephones to meet the needs of consumers and to promote more effective use of the radio spectrum.

B. Issues Raised by the Public in Response to the Initial Analyses: No commenting parties raised issues specifically in response to the initial regulatory flexibility analysis. The regulations being adopted in this Report and Order add new frequencies, in addition to retaining the existing frequencies, for cordless telephones. New restrictions, designed to prevent harmful interference to licensed radio services, are placed only on the use of the new frequencies.

The regulations are technically and economically achievable without undue burden on any entity. Manufacturers are being given substantial flexibility on how to implement the new frequencies, including the option of continuing to manufacture, import and market cordless telephones presently operating under the existing regulations.

C. Any Significant Alternative Minimizing Impact on Small Entities and Consistent with Stated Objectives: We have reduced burdens wherever possible. The regulatory burdens we have retained are necessary to ensure that the public receives the benefits of reduced channel congestion while using cordless telephones, without causing interference to other licensed services. The Commission has considered all of the alternatives presented in this proceeding and has adopted standards that can be achieved by industry while still providing adequate protection to licensed service such as the Television Broadcasting Service, and the Private Land Mobile Radio Service. Alternatives that were considered include deleting all standards and restrictions, retaining the present regulations, adopting the regulations proposed in the NPRM, and adopting tighter standards than proposed. In addition, alternative frequencies, such as the availability of 900 MHz and 2 GHz frequencies, and the alternative in future personal communications services (PCS) were considered. In addition, methods of reducing

interference to licensed services, such as the Private Land Mobile Radio Service and the Television Broadcast Service, such as monitoring before transmitting and allocating frequencies with the highest probability of not causing interference to the cordless telephone base unit, were also considered. We will continue to examine alternatives in the future with the objectives of eliminating unnecessary regulations and minimizing any significant impact on small entities.